ruary, 1880.—Rev. W. H. Dallinger, on a series of experiments made to determine the thermal death-point of known monad germs when the heat is endured in a fluid (Pl. 1 and 2). —Dr. P. M. Duncan, on a part of the life-cycle of *Clathrocystis æruginosa* (Kützing).—Prof. E. Abbe, some remarks on the apertometer.—A. D. Michaël, a further contribution to the knowledge of British Oribatidæ, part 1 (Pl. 3 and 4). With the assistance of C. F. George the life histories of fifteen species are mentioned as traced for the first time, the same number are described as new to the British fauna, and of these four are new species, five have been previously found in France, four in Germany, one in both of these countries, and one in Spitzbergen. Part 2, with two more plates, is promised in the April number.—G. Gulliver, the classificatory significance of raphides in Hydrangea.—W. Teasdale, on a simple revolving object-holder.—The record of current researches, bibliography, and proceedings of the Society.

Zeitschrift für wissenschaftliche Zoologie, Bd. 33, Heft 4, January 23.—Dr. Philipp Stöhr, on the history of the development of the skull in the Urodela, pl. 29, 30.—Karl Richard Krieger, on the minute structure of the central nervous system in the crayfish, pl. 31, 33.—Dr. Julius Krueg, on the fissures of the cortical surface of the cerebral hemispheres of the zonoplacental mammals, pl. 34, 38.—J. Ciamician, on *Lafoëa parasitica*, sp. n., pl. 39, figured on a species of Aglaophenia from Trieste.

Reale Istituto Lombardo di Scienze e Lettere, Rendiconti, vol. xiii., fasc. ii.—On the *trichamœba irta* of De Fromontel and Me. Jobard-Muteau, by Prof. Maggi.—On the transmission of heat between two fluids in motion separated by a solid wall, by Dr. Grassi.—On some geometrical and mechanical relations concerning lines of double curvature, by Prof. Bardelli.

Journal of the Franklin Institute, January.—Locomotive spark-arresters, by Mr. J. S. Bell.—Standard sizes in cylindrical fitting, by Mr. Richards.—Saws, by Dr. Grimshaw.—On the method of milk shipment in glass jars, by Dr. Morris.—Velocity of light, by Dr. Chase.

Gazetta Chimica Italiana, fasc. i.—Crystallographic study of some substances of the aromatic series, by Signor La Valle.—Further observations on digallic acid, by S. Schiff.—Contribution to the chemical history of the Stereocaulon Vesuvianum, by S. Coppola.—New method of determining the points of fusion of organic substances, by S. Roster.—Researches on podophyllin, by S. Guareschi.—Chemical study of the meteorite of Albarello, by S. Maissen.—Chemical researches on the yellow incrustations of the Vesuvian lava of 1631, by S. Scacchi.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, February 26.—"On some of the Effects produced by an Induction Coil with a De Meritens Magneto-Electric Machine." By William Spottiswoode, P.R.S.

In the *Philosophical Magazine* for November of last year I gave an account of a mode of exciting an induction coil by the direct application of one of M. de Meritens's alternating machines, without the intervention of a contact-breaker or the use of a condenser. The experiments of Prof. Dewar, described before the Royal Society (see *Proceedings*, February 13, 1880), have led me to think that an account of some of the peculiarities in the induced discharge, might be acceptable to the Society.

And, first, as regards the secondary discharge in air. It was mentioned in the paper first quoted that the spark produced by this machine presented an unusually thick yellow flame, and that it was accompanied by a hissing noise different from that commonly heard with a coil excited by a battery. The spark was observed in a revolving mirror, first in a vertical and secondly in a horizontal direction. The discharge, although apparently continuous, was immediately seen to be intermittent, with a period in unison with that of the machine. Tongues of flame, leading alternately from one terminal and from the other, crossed the field of view. The length of spark first used (vertically) was about half an inch. When the length was increased to about two inches flashes or bands of continuous light were seen to traverse the field of view in diagonals of low slope (*i.e.*, nearly horizontally), showing that there were masses of heated matter passing from time to time at moderate velocity between the terminals. From the known period of the machine and the number of the discharges crossed by these flashes in their passage from terminal to terminal, it was calculated that the time of passage was about ·03 of a second. Occasionally there was a still brighter flash or meteor, which similarly traversed the field, but with a velocity apparently of about double that of the others.

On observing the discharge (vertical) in air attentively, it was noticed that whenever a true spark passed, its passage was marked, as usual, by an irregular bright line when its path was outside the aureola or flame, but by a similar dark line when its path was within the aureola.

The spectrum of the secondary spark was then examined with terminals of various metals.

Aluminium.—The spectrum showed a faint continuous background with the yellow sodium lines, and faint oxide of aluminium lines. This was with a spark of half an inch. But although the spark was subsequently lengthened, no difference in the spectrum was perceived excepting that the continuous background was rendered more bright.

It would seem that these appearances are due to some such process as the following:—The heat due to oxidation, added to that of the discharge, is sufficient to volatilise the oxide of aluminium, but that in its passage across the interval between the terminals, the oxide becomes so cooled that it gives a continuous spectrum. When the spark was lengthened, the oxide, although perhaps at first more heated than with the shorter spark, had more time to cool.

Magnesium.—In this, as in the former case, we have a faint continuous spectrum as a background, on which were seen the *b* group of magnesium lines. One other line in the blue occasionally flashed out, but was not permanently present. There was also a faint trace of the oxide spectrum. The contrast between the cases of aluminium and magnesium, in respect of the prominence of the oxide, or of the true metallic spectrum, is doubtless due to the fact that in the former case the oxide, and in the latter the metal, is the one which is more easily vaporised. On sending a blast of air on the discharge, the blue line always disappeared; the current of air having lowered the temperature so far as to prevent the vaporisation necessary for its production.

When the spark between magnesium terminals was made to pass through hydrogen, the characteristic lines of hydrogen were seen, apparently owing to a rise in temperature. This, as mentioned below, does not occur with carbon poles.

Platinum.—With terminals of this metal the spectrum was mainly continuous, with the addition of the ubiquitous yellow sodium lines. When the spark was short, a few bands were faintly visible, some apparently those of nitrogen, and others in the blue and violet belonging to the oxide of platinum. When the spark was lengthened these bands disappeared, and nothing but the continuous spectrum (with the D lines) was visible.

It appears from these experiments that the application of the De Meritens machine to the induction coil furnishes us with the means of isolating certain lines of the metallic spectrum from the rest. It has, in fact, enabled us to reduce at pleasure the spectra of aluminium, of magnesium, and of platinum, to their most persistent lines, precisely as had already been noticed as occurring by natural processes in the cases of sodium and of calcium. As a general rule, when the spark is shortened, the metallic or the oxide lines come out, when it is lengthened they disappear.

From this we may conclude (1) that the discharge which we have been examining is a real flame with metallic particles passing between the terminals in a solid condition; and (2) that in general the temperature is comparatively low, *i.e.*, that it is insufficient to cause any considerable vaporisation. This is notably the case when the arc is long, and when the matter thrown off from the terminals has sufficient time in its passage to cool.

The spark was then tried between carbon terminals in atmospheres of hydrogen and of carbonic acid. In none of them did the spectrum show any gas lines, but with hydrogen there were faint traces of the hydrocarbon group in the green. In this respect the spark differs from the discharge direct from the machine, inasmuch as the latter gives some of the hydrogen lines in hydrogen and carbon lines in carbonic acid.

When magnesium terminals were used in an atmosphere of hydrogen, the yellow sodium lines, the blue and green magnesium lines, and the red line of hydrogen were visible near the terminals, with a continuous background. When the magnet was excited, the only change observed was that the lines became slightly fainter.

When the spark was discharged in a magnetic field, known phenomena were reproduced, but owing to the thickness and mass of the flame and the extraordinary strength of the magnetic field, they were exhibited in a state of great splendour.

When the spark passed in an equatorial direction the whole flame was spread out in an equatorial plane, in which heated masses might be seen revolving in one direction or in the other in the neighbourhood of each of the magnetic poles. When the spark passed in an axial direction, or when the poles themselves were made the terminals, the phenomena described in my paper "On an Experiment in Electro-Magnetic Rotation" (*Proc.* Roy. Soc., March 30, 1876) were reproduced.

Whatever was the direction of the spark, the resistance due to the magnetic field was such as to extinguish the discharge, provided that the striking distance was near the limit that it could attain when no magnetic field was present. If a plate of glass was interposed between the poles of the magnet (which were still used as terminals) the yellow flame disappeared, and the spark divided itself into numerous ramifications of true sparks which found their way round the edges of the plate. As soon as the magnet was excited the resistance in the field became so great as to exceed that of the glass plate itself, and the plate was pierced.

Prof. Dewar was good enough to measure the efficiency of the secondary discharge, by taking an inch spark in a glass bulb placed in the centre of a calorimeter, in the same way as he had already measured the efficiency of the intermittent current direct from the machine. The former amounted to about 430 gramme-units per minute, while the latter had been found to be 6,000 per minute. The relative efficiency may, therefore, be taken at about 1 : 15. And as the machine was giving about 300 currents per second, this would give for the secondary

$$430 : 60 \times 300 = \cdot 023 \text{ units per discharge,}$$

and for the primary

$$6000 : 60 \times 300 = \cdot 3 \text{ units per discharge.}$$

Leaving the subject of the spark from the induction-coil, one of the most remarkable effects produced by this machine was the illumination of vacuum tubes by the currents taken simply from the machine. A small sphere of about two inches in diameter, with an air-vacuum, and having two parallel straight terminals reaching nearly across the sphere and about half an inch apart, was (after the first attempt, when there was some difficulty in getting the discharge to pass) readily illuminated. Owing to the alternate currents, both terminals were of course surrounded with the usual blue halo. When the speed of the machine was reduced, the discharge through the tube was not maintained, showing that only that part of the current from the machine which possessed the highest electromotive force, and perhaps also the greatest strength, was sufficient, and was therefore actually used for the purpose. As this was apparently only a small fraction of the whole current, we may herein find an explanation of the fact that, compared with the effect from the induction spark, the illumination was moderate, and the heating insignificant. It would perhaps not be easy to establish an accurate comparison between this and other sources of electricity; but some idea may be conveyed by the fact that, from experiments made with this tube with Mr. De La Rue's chloride of silver battery on a former occasion, and quite independently of the present question, it was estimated that a current having an electromotive force of 400 volts was necessary to effect a discharge.

Other tubes were tried, and were illuminated in the same way.

Chemical Society, February 19.—Mr. Warren De la Rue, president, in the chair.—The list of Officers and Council proposed by the Council for the ensuing year was read from the chair. The principal changes are: President: H. E. Roscoe. Vice-Presidents: Warren De la Rue, J. Dewar, V. Harcourt, in the place of F. Field and H. E. Roscoe. Other Members of the Council: C. Graham, H. McLeod, E. J. Mills, J. M. Thomson, instead of A. H. Church, W. H. Hartley, and E. Riley, who retire.—During the evening the President mentioned that a crystal had been prepared by Mr. Hannay, of Glasgow; its angles, lustre, hardness, &c., were identical with those of the diamond; a similar crystal when burnt was found to contain 97 per cent. of carbon; it was therefore to all intents and purposes a diamond.—The following papers were read:—On the production of ozone during the combustion of coal-gas, by R. H. Ridout. The author has observed that a Bunsen burner produces ozone, which substance is also formed by the combustion of coal-gas from a glass tube $\frac{1}{8}$th of an inch in diameter, placed in the centre of a tube $\frac{5}{8}$ths of an inch in diameter and 15 inches long. Ether and alcohol burned from wicks made of capillary glass tubes, gave similar results.—Prof. McLeod then made some remarks in reply to a criticism of Mr. Kingzett as to the formation of ozone during the slow oxidation of phosphorus. In his opinion, while fully admitting the justice of Mr. Kingzett's criticism, the evidence was quite conclusive without the quantitative results. He had made about 100 experiments and had not been able to find any proof as to the formation of peroxide of hydrogen, whilst the presence of ozone could be always detected. —Mr. R. H. Ridout gave a short account of some new and improved laboratory appliances—a blowpipe for gas or spirit, an india-rubber test-tube brush, an apparatus for saturating a liquid with sulphuretted hydrogen without the slightest escape of that gas, a filter funnel, consisting of a funnel with a stem 0·5 mm. and the sides ground to the angle of 60°, a continuous aspirator, consisting of a piece of lead tube $\frac{3}{8}$ths of an inch in diameter, bent into a circle having a small hole in the concave side, into which the aspirating tube is fixed; a filter funnel in which the vacuum is obtained by the condensation of steam, and an apparatus for taking the gravity of liquids in terms of water at the same or other temperatures.—Dr. Armstrong then made some remarks on some recent researches on the so-called unsaturated compounds.

Zoological Society, February 17.—Arthur Grote, vice-president, in the chair.—Mr. Sclater exhibited and made remarks on a skin of *Colobus palliatus*, Peters, from the Zanzibar Coast, and pointed out its apparent identity with his *Colobus angolensis*. —A letter was read from Mr. W. B. Pryer, of Elopura, Bay of Sandakan, Northern Borneo, relating to certain birds and quadrupeds of that country.—Prof. Flower exhibited and made remarks on the skull of a two-horned Rhinoceros (*Rhinoceros sumatrensis*), which had been obtained in Sandakan, Northern Borneo, by Mr. W. B. Pryer.—Mr. Sclater exhibited and made remarks on the drawing of an apparently new parrot, of the genus *Chrysotis*, now living in the Society's Gardens, which he proposed to call *Chrysotis cœligena*, after Mr. Lawrence's MS. —Prof. Flower, F.R.S., read a paper on the anatomy of the bush dog (*Icticyon venaticus*), based on a specimen lately living in the Society's Gardens.—Mr. W. A. Forbes read a paper on some points in the structure of *Nasiterna*, bearing on its affinities.—A communication was read from Mr. Geoffrey Nevill, C.M.Z.S., containing a paper on the land shells, extinct and living, of the neighbourhood of Mentone (Alpes Maritimes), with descriptions of a new genus and of several new species.—Mr. W. Tegetmeier read a note on the synonymy of the Kaffir Crane, commonly called *Balearica regulorum* (Licht.).—Lord Walsingham read a paper on some new or little-known species of Tineidæ, from North America.

Royal Microscopical Society, February 11.—Anniversary meeting, Dr. Beale, F.R.S., president, in the chair.—Twelve gentlemen were elected or nominated for Fellowship.—The reports of the Council and Treasurer showed that the condition of the Society was highly satisfactory, an exceptionally large number of new Fellows having been elected last year, and the revenue having increased by more than 200*l*. A special vote of thanks was given to Mr. Crisp in recognition of his honorary editorship of the journal accompanied by bound copies of vol. i. and ii. with suitable inscriptions. The Officers and Council were elected for the ensuing year as follows:—President: Lionel S. Beale, F.R.S. Vice-Presidents: Robert Braithwaite, M.D., W. B. Carpenter, C.B., F.R.S., Prof. P. Martin Duncan, F.R.S., Henry J. Slack, F.G.S. Treasurer: John Ware Stephenson, F.R.A.S. Secretaries: Charles Stewart, M.R.C.S., Frank Crisp, LL.B., B.A. Members of Council: John Badcock, William A. Bevington, Arthur E. Durham, F.R.C.S., Charles James Fox, James Glaisher, F.R.S., A. de Souza Guimaraens, William J. Gray, M.D., John Matthews, M.D., Albert D. Michael, F.L.S., John Millar, L.R.C.P.E., Frederic H. Ward, M.R.C.S., T. Charters White, M.R.C.S.—The President delivered his annual address, in which, after referring to the gratifying position of the Society, and the great improvement that had taken place in the journal, he discussed the nature of the changes occurring in living matter. Facts and arguments were adduced against the doctrine generally entertained concerning the physical nature of vital phenomena. Many of Dr. Allman's statements in his British Association address were called in question and serious objections raised to the acceptance of *Bathybius Haeckelii* in the existence of which Dr. Beale did not believe.

Anthropological Institute, February 10.—Francis Galton, F.R.S., vice-president, in the chair.—The following New Members were announced:—Thomas Hodgkin, Alfred Tucker, B.A., H. C. Stephens, J. A. Farrer, Bryce M. Wright, F.G.S., T. W. U. Robinson, F.S.A., and W. D. Gooch.—Dr. Emil Holub delivered an address on the Central South African tribes from the South Coast to the Zambesi. Dr. Holub had found along the South Coast traces of tribes which do not now exist, heaps of burnt bones of wild animals, none of domestic animals, and broken shells. Other tribes once belonged to the regions between the Limpopo and the Zambesi, and here were found ruins of towns, generally in the vicinity of mines, especially gold mines. The houses were of stone, on the top of mountains, put together without any cement, but so well fitted that they have stood for hundreds of years. Some of the ruins were formed of blocks of granite in the shape of bricks. The tops of small hills were fortified in this way, with openings in the walls. The remains probably belong to those who inhabited the ancient empire of Monopotapa, mentioned by the Dutch and Portuguese traders as existing two hundred years ago. When a country is conquered it is the custom to kill all the male population, take the women and children prisoners, and educate the latter as warriors of the victorious tribe; in this way whole tribes have ceased to exist in South Africa; even since Livingstone's time a powerful tribe of the Basutos, on the Upper Zambesi, named the Makololos, has been almost exterminated. Dr. Holub divided the living tribes into three races, the Bushmen, the Hottentots, and the Bantus; he found a link between the Bushmen and the Bantu family, and between the Bushmen and the negroes, but not between the Hottentots and the Bantus. The Bushmen are rapidly dying out, and are utterly incapable of civilisation. They use stone weapons and poisoned arrows, but the bows and arrows are of very simple construction compared with those in use among the natives of North and South America. The Hottentot race is divided into three tribes, the real Hottentots, the Griquas, and the Koranas. No South African tribe has taken so eagerly to the vices of civilisation as the Hottentot race. The Bechuanas observe many of the virtues of the white man, but the Hottentot adopts only his vices. Drunkenness is the chief cause of their dying out. They do not seem to have any religion, but a kind of freemasonry exists among them, the outward and visible sign of which is three cuts on the chest made with appropriate ceremony.

Meteorological Society, February 18.—Mr. G. J. Symons, F.R.S., president, in the chair.—Dr. J. S. Cameron, Dr. F. E. Carey, J. B. Charlesworth, A. Collenette, S. Forrest, J. G. Gamble, H. J. Marten, J. Nixon, B.A., W. P. Propert, LL.D., S. Rostron, W. P. Swainson, and E. W. Wallis, were elected Fellows.—The papers read were:—On typhoons in China, 1877 and 1878, by Lieut. A. Carpenter, R.N.—Note on the reports of wind force and velocity during the Tay Bridge storm, December 28, 1879, by R. H. Scott, F.R.S. These reports seemed to show that the velocity of the wind on that occasion was not so high as was generally supposed and had been frequently exceeded, but that some of the gusts were very violent.—On the frost of December, 1879, over the British Isles, by W. Marriott, F.M.S. Exceptionally low temperatures were registered all over the British Isles from the 1st to the 7th of December. On the 1st the lowest temperature was − 2° at Ketton, near Stamford; and the next lowest was 5° at Trent College. The temperature continued low throughout the day, at several places not rising above the freezing point. On the 2nd the cold was more intense, in the counties of Leicester, Lincoln, and Nottingham, the temperature fell below zero, the lowest being −4°·5 at Coston, near Melton Mowbray. Temperatures between 0° and 10° were registered in the north and south of Scotland and along the central part of the north of England to the Midland and Eastern Counties; while over the whole of England, Scotland, and Ireland, with the exception of the sea-coast stations, the temperature fell below 20°. On the 3rd the temperature was more evenly distributed and not quite so intense as on the previous day; however, in the North Riding of Yorkshire and the Valley of the Tees, readings at and below zero were registered, the lowest being −2° at Gainford. On the 4th intensely cold weather was experienced over the south of Scotland and the north of England, the lowest reading obtained was −23°, at Blackadder in Berwickshire, −16° was also registered at Springwood Park, near Kelso, and readings of −5° were reported at Haddington, Melrose, and Corbridge-on-Tyne, and −4° at Alston. Temperatures below 10° were registered over the south and south-east of Scotland, and over the north of England as far as the Valley of the Trent and also in the eastern counties, while over almost the whole of England, Scotland, and Ireland the temperature fell below 20°. In some parts of the south of Scotland and the border counties the maximum temperature during the day did not rise to 20°. On the 5th the minimum temperature was not so low as on the previous day, there being a cloudy sky and a general fall of snow. In Ireland, however, this was the coldest day of the month. On the 6th the temperature fell considerably in Derbyshire, Nottinghamshire, and Yorkshire, readings of − 3° being recorded at Trent, − 1°·0 at Buxton, and 0° at York and Stanley. At many places the maximum temperature during the day was much below the freezing point. On the 7th very low temperatures were registered over the whole of the north and the east of England; the lowest reported was − 10° at Ketton, near Stamford. The temperature fell below zero in the counties of Essex, Leicester, Derby, Lincoln, Nottingham, and York, and also in the south of Scotland, while over almost the whole of the north-east and central part of England as well as a portion of the south-east district, the temperature fell to 10° degrees or below. Readings below 20° prevailed over nearly the whole of England and Scotland, and the centre of Ireland. The maximum temperature during the day at a few places was extremely low, the thermometer at Appleby only recording 12°·4, and that at York 18°. During the next few days a little warmer weather prevailed, but on the 11th the temperature fell below 20° over the central part of England, Scotland, and Ireland. Low temperatures were also experienced at most places on the 12th. Milder weather continued for the next few days, but on the 17th the temperature again fell below 20° over the whole of the south of England. Low temperatures also prevailed on the 18th, 21st, 23rd, 24th, and 26th, while the maximum temperatures at many places on the 21st and 26th did not reach 32°. At almost all the inland stations frost occurred on an average of about twenty five days during the month, and temperatures below 20° were registered from eight to thirteen days at several places. The only station where frost was not felt was Scilly, the lowest temperature recorded there being 33° on the 2nd. The only comparatively mild districts were the west and south of Ireland, and the extreme south-west of England. Even the sea-side health resorts which are reputed for their mild climates were not exempt from the cold, the temperature falling below the freezing point on eleven occasions at Ventnor, fifteen at Torquay, twenty at Sidmouth and Eastbourne, and twenty-four at Ramsgate and Worthing. During the time of the cold weather the barometer was very high over these islands, and an anticyclone was formed over those districts where the lowest temperatures were recorded. That the cold was the result chiefly of radiation is shown by the great difference in temperature at the hill and valley stations. For instance at Farley 640 feet above sea level 17°·7 was registered on the 7th, while at Oakamoor, 300 feet lower in the Valley of the Churnet, and less than a mile distant from Farley, the temperature fell to 1°·1. The effect of the cold upon the health of the community was very great. In London the number of deaths referred to diseases of the respiratory organs increased to 799 in the week ending December 20, and exceeded the weekly average by 288. The public journals record the fact that several persons were frozen to death in various parts of the country. The frost also caused great injury to plants, shrubs, and birds.

Entomological Society, February 4.—J. W. Dunning, M.A., F.L.S., vice-president, in the chair.—Mr. Patrick F. Copland, of Buckhurst Hill, was elected a Member, and Mr. John B. Bridgman and Mr. Peter Cowell Subscribers to the Society.—Mr. Stainton exhibited, on behalf of Mr. Grigg, of Bristol, a specimen of *Heliothis scutosa* captured near Weston-super-Mare.—Mr. Pascoe exhibited a specimen of the "fire-fly" of the Amazon Valley, *Aspisoma lineatum*. It has the usual intermittent light flashing at intervals of two seconds, but Mr. Pascoe believed it was capable of keeping back the light for an indefinite time. The Rev. H. S. Gorham objected to the term fire-fly being applied indiscriminately to all luminous insects, there being many luminous coleoptera, and as regards the flashing of the light from these insects, he considered it was often simply due to the creatures crawling over leaves and herbage, and thus exposing the ventral surface only at times. Mr. Meldola remarked that some years ago he had examined the spectrum of the glow-worm, and found that it was continuous, being rich in green and blue rays, and comparatively poor in red and yellow.—Mr. Pascoe also exhibited the two sexes of *Isopogon hottentotus*, a dipterous insect which was reported as hitherto unrecorded in this country, and remarked upon the gregarious habits of this species compared with those of others of the family.—The Secretary exhibited, on behalf of Mr. George Francis, of Adelaide, specimens of a South Australian moth (Anapæa, sp.), which feeds on the native Eucalypti.—Mr. Swinton forwarded a letter calling in question the specific distinctness of *Acronycta psi* and *A. tridens*, considered as separate species by Mr. Butler in a recent communication.—Mr. Meldola read a note on the protective attitude of the caterpillar of the lobster moth, extracted from *Kosmos*, November, 1879.—The following papers were also communicated:—Materials for a revision of the Lampyridæ, part 2, by the Rev. H. S. Gorham, and on some coleoptera from the Hawaiian Islands, by Dr. Sharp.

Photographic Society, February 10.—J. Glaisher, F.R.S., president, in the chair.—Dr. Huggins, F.R.S., read a paper on the photographic spectra of stars, and described the apparatus he had devised. Through a slit the 350th part of an inch, the spectrum of a star was kept by a special arrangement upon a gelatine emulsion plate in the same place, by artificial light being thrown upon a polished silver plate placed over the slit, enabling the image of the star to be seen and continuously watched during a long photographic exposure; thus any irregularity in the motion of the telescope could be instantly corrected. The slit was also provided with two shutters, so that one only being used upon a star, the other half could have a second known spectrum taken upon the same plate, and thus determine the wave-lengths of the lines of the spectra. Dr. Huggins stated that white stars gave lines due to hydrogen, as "Vega;" whilst "Arcturis," with an orange light, gave strong lines, due to "calcium," suggesting that it was farther removed in the order of change from "Vega" than is the solar spectrum.—Capt. Abney, R.E., F.R.S., read a paper on a process for printing by development. A paper is prepared with iodide and bromide potassium, sensitised with silver nitrate, and washed; after exposure, developed with ferrous oxalate and fixed with hyposulphite of soda.

Institution of Civil Engineers, February 24.—Mr. Brunlees, vice-president, in the chair.—The paper read was on the use of asphalt and mineral bitumen in engineering works, by Mr. W. H. Delano, Assoc. Inst. C.E.

PARIS

Academy of Sciences, February 23.—M. Edm. Becquerel in the chair.—The Secretary announced the death of M. Favre, Correspondent in Chemistry, on February 17, and recalled his services to science.—Heat of formation of persulphuric acid, by M. Berthelot. The formations of oxygenated water, persulphuric acid, and ozone are endothermic, and form a graduated scale; they absorb respectively 10·8, 13·8, and 14·8 calories.—On the decomposition of oxygenated water in presence of alkalies, and on derivatives of bioxide of barium, by the same. The spontaneous decomposition of bioxide of barium is explained by displacement of the second equivalent of oxygen by water, the compound being thus changed into hydrate of baryta with liberation of heat. The same series of reactions explains the instability of oxygenated water in presence of a trace of baryta or other alkali.—On the heat of combination of hydrate of chloral, by M. Wurtz. He describes apparatus (very like M. Berthelot's) for finding whether vapours of anhydrous chloral and water, when they meet, liberate heat; the results were negative. M. Deville thought M. Wurtz had not taken sufficient account of the relation between the volumes of the meeting vapours.—On sap-vessels proper in Gramineæ, by M. Trécul.—On some linear differential equations of the second order, by M. Gyldén.—On the divisors of cyclotomic functions, by Prof. Sylvester.—On some of the collections brought by the North-East Passage Expedition by the Glacial Sea of Siberia, by Prof. Nordenskjöld (letter). These include a rich collection of invertebrates (dredged at 30 to 100 m.), and indicating a fauna richer in individuals than one finds in the tropics; lichens and algæ, bones of subfossil whales, tertiary fossil plants of Nagasachi and Labuan, implements, arms, &c., of Eskimo and Tchouktchis, and 1,040 old Japanese works.—Production and crystallisation of an anhydrous silicate (enstatite) in presence of steam at ordinary pressure, by M. Meunier. Steam is sent through a heated porcelain tube containing magnesium and receiving near one end the vapour of chloride of silicium. Enstatite is deposited in the tube of exit as an abundant white powder, and the crystals are very like those found in natural meteorites. M. Meunier remarks that the mixture of protuberantial vapours in the sun contains all the elements necessary to form magnesium silicates, if there were sufficient cooling.—Generalisation of two theorems on the functions O, by Mr. Elliot.—Determination of the mean tensions developed at the extremities of a heavy cord, oscillating about a position of apparent rest, by M. Léauté.—Observations of solar spots and protuberances during the third and fourth quarters of 1879, by P. Tacchini. The author's figures, from observations half at Palermo and half at Rome, by the same method, show the increase of solar activity. The protuberances have gradually extended to near the poles, showing a maximum, as usual, between 30° and 50° lat. in each hemisphere. The faculæ also continue to show their maximum between 10° and 30°. The number of faculæ and protuberances is slightly greater in the northern hemisphere, as before.—Comparison between the curves of tensions of saturated vapours, by M. Mondesir.—On a new electro-magnet, by M. Chambria. He increases the extent of the surfaces presented to each other, viz., the end of the core, and the oscillating armature; *e.g.*, a projection on the armature enters a hollow of the core, or conversely, or the circumference of the core enters a circular groove in the armature. His electromagnet applied to a Morse or Breguet telegraphic receiver requires a battery of 8 to 10 elements, as against 15 elements needed with plane magnet and armature. The remanent magnetism too, seems weakened.—Use of tempered glass in construction of condensers, by M. Ducretet. Leyden jars so made take a stronger charge and give better sparks.—On the preparation of acetylene, by M. Jungfleisch. He effects this by incomplete combustion of coal-gas; a flame being produced by a jet of air entering an atmosphere of the gas. The products of combustion are drawn off (by means of a *trompe*) into other vessels, in which the steam is condensed and the acetylene separated.—Determination of the heats of combustion of glycerine and ethylenic glycol, by M. Louguinine.—On a digestive ferment which is produced in panification, by M. Scheurer-Kestner. Meat mixed with flour and baker's yeast forming a paste, is fused into the mass of bread during panary fermentation. The author's father observed this, and he prepared, in 1873, a soup-bread containing 50 per cent. of meat, it could be kept indefinitely without alteration, and, dissolved in boiling water, made excellent soup.—M. Cosson stated that during the siege of Paris, powdered bone, that had served in preparation of glue, was incorporated with bread and biscuit, making useful panada.—On the formation of ovules and the ovary in mammalia and oviparous vertebrates, by M. Cadrat.—Study of modifications produced in the animal organism, by various albuminoid substances injected into the vessels (third series, soluble ferments), by MM. Bechamp and Baltus.—Diastase of germinated barley, so injected, is found partly in the urine, undergoes no alteration in the system, and causes considerable functional disorders.—On some examples of antagonism between heredity and environment, by M. Mer.—On a silicate of sesquioxide of iron and potash corresponding to amphigene, by M. Hautefeuille.

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